

ON THE DISCOVERY OF A FOSSIL WHALE IN THE
OLDER TERTIARIES OF TORQUAY, VICTORIA

By B. G. PRITCHARD, D.S.C.

INTRODUCTION

In the early part of January, 1932, accompanied by Mr. F. S. Colliver and Mr. Alan Frostick, I visited Torquay and spent some time in collecting fossils for which that locality is famous. Among other good finds, we detected a few exposed bones in the cliff face about 12 feet above the level of the beach. Several bones were present with a piece of the upper jaw partially exposing three simple conical teeth with their apices well worn down.

As the position on the cliff was a very awkward one it was decided to take out a good solid block with the bones in it, and do the trimming and opening up under more suitable conditions later. After much pick and hammer and chisel work, a block about two feet long by 18 inches wide was detached from the cliff face and gradually lowered down the ladder with the assistance of some interested onlookers. The exact location of this find was barely a hundred yards around the Bird Rock corner, so the first trimming of the block was necessarily somewhat hurried as the tide was coming in fast, but even this preliminary work showed what extreme care would have to be taken, for another bone was just being exposed at the back of the block. It now became necessary to move on with our prize or get a thorough wetting, and when safe from tidal influence several more pounds of matrix were carefully removed.

One of our interested assistants Mr. Grix of Geelong, carried the block to Torquay in his car. Next day I cleaned up the fragment of upper jaw and was able to develop two more teeth, making five in all. Adjoining this is the greater part of the skull, base uppermost. The next piece to be exposed was the other front half of the upper jaw with five tooth sockets showing, but all the teeth had been shed. Then I carefully traced out the lower bone and it proved to be the complete left half of the lower jaw with six teeth in position. I have since opened up the upper surface of this bone and exposed the sockets for the rest of the teeth of the jaw. Behind the back of the skull, the first vertebral bone in a good state of preservation has been opened up.

During the preparation for the removal of the block, a single molar tooth was also obtained which no doubt belonged to this skull. This tooth is of particular interest as it shows characters which will have an important bearing on the generic position of the remains as a whole. Thus gradually the original block has been reduced in size and weight, and more and more interest has arisen as these important relics have been slowly developed. It is possible that a number of additional items may yet be opened up on this specimen.

A little further along the coast, and practically on the same horizon, a number of interesting whale remains were also obtained, including vertebrae very close up to the skull and other bones of this region. From this position I was able, several years ago, to obtain several vertebral bones, and some ribs. Mr. Frostick also secured, from a slightly lower horizon a little further along, near the Fishermen's Steps, a single, simple, conical tooth of the type usually known as *Squalodon wilkinsoni*; but now referred to as *Parasqualodon wilkinsoni*. This does not seem to fit in any way on to the skull and jaw obtained.

PREVIOUS RECORDS

The occurrence of our first fossil whale remains was recorded by the late Sir Frederick McCoy (1), as far back as 1864, when



Fig. 1. Top view of teeth and jaws of *Mammalodon colliveri*, Pritchard; also single two fanged molar obtained close to the above specimen.

he wrote a paper for the *Geological Magazine*, and figured and described a tooth under the name of *Squalodon wilkinsoni* from the Tertiary polyzoal limestones of Cape Otway. Cape Otway itself is composed of Jurassic Sandstones, at some distance to the west the fossiliferous clays of the older Tertiary make their appearance but it is not for several miles that the polyzoal limestone is encountered, in the neighbourhood of Castle Cove; and this is the locality indicated in a later paper by McCoy.

In 1866 in one of the Exhibition Essays on the Recent Zoology and Palaeontology of Victoria McCoy (2) states: "The only marine mammal of which I have seen portions which could be identified in these beds is a new species of *Squalodon* or *Phocodon* (*P. wilkinsoni*, McCoy) from the Miocene Tertiary sands of the Cape Otway coast; and as this genus is only known in Miocene strata of Malta and the French Falun, the occurrence of a new species of so restricted a genus is not only valuable as an addition to palaeontology but," etc.:

"The molar teeth of *P. wilkinsoni* are smaller than the Malta *P. scillae* and agree most nearly with the *Squalodon* (*Phocodon*) *gratcloupi*, Meyr; of the miocene beds near Bordeaux, from which the Australian species differs chiefly in smaller size, some details of proportions and the relatively larger roots indicating a greater depth of jaw."

In 1875 McCoy (3) described one of the hindmost molars of a Zeuglodon whale from the older Tertiary beds of Castle Cove, near Cape Otway; under the name *Squalodon wilkinsoni*. In 1879 McCoy (4) described a simple, conical, arched, anterior tooth which he attributed also to *Squalodon wilkinsoni*, from the Waurn Ponds limestone quarries and found by Mr. Nelson.

In 1881 E. B. Sanger (5) described a single imperfect molar from the older Tertiary beds of Wellington, Murray River, South Australia, under the name of *Zeuglodon harwoodi*. This specimen appears to have disappeared, for the late Dr. T. S. Hall endeavoured to trace it, but without success. Dr. Hall attaches another specimen from the Mt. Gambier limestones to Sanger's species, and regards it as distinct from McCoy's species, possessing the more slender roots together with a difference in the size and arrangement of the cusps.

Professor Ralph Tate (6) in his Census of the Fauna of the Older Tertiary of Australia, in 1888, lists under Mammalia: *Squalodon*, 1 sp., and *Zeuglodon*, 1 sp.

A molar tooth found at Table Cape, Tasmania, was regarded by Prof. Tate as a *Zeuglodon*, and was given a manuscript specific name, *Z. brevicuspispidatus*, but this has not been described, and after personal examination of the specimen Dr. Hall came to the conclusion that it was conspecific with McCoy's species, perhaps being a rather more anterior tooth.

Other odd teeth, incisors, praemolars, and molars, have on various occasions been discovered by different collectors at different localities, chiefly the Spring Creek or Torquay sections, Waurn Ponds limestones, and the Table Cape beds; but no details of any of these have been published, merely being identified as *Squalodon wilkinsoni*, McCoy.

In 1893, R. Lydekker (7) in a paper on the "Cetacean Skulls from Patagonia" describes *Prosqualodon australis* n.g. et sp.-- "An imperfect skull from Chubut belongs to a species of *Squalodon* which, from the character of the teeth and mandible, must apparently be referred to a genus distinct to the one in which all the European representatives of the family have been included in the British Museum Catalogues of Fossil Mammals."

In this specimen the nasals are small triangular bones carried on a projecting ridge of the frontals, and thus, to a slight degree, roof over the nasal cavity. The mandibular ramus curves inwards

in front of the first molar, after which it bends as markedly outwards and the symphysis could not have extended behind the middle of the praemolar series. Apparently the typical molar teeth are reduced to five or possibly six, in place of the seven of *Squalodon*, and four other sockets in the jaw being simple in character, may be reckoned as praemolars.

These differences, according to Lydekker, are amply sufficient to justify its separation from *Squalodon*.

In 1899, R. Lydekker (8) in a paper "On the Skull of a Shark-toothed Dolphin from Patagonia," states: "In *Prosqualodon* from



Fig. 2. Side view of jaws and skull of *Mammalodon colliveri*, Pritchard.

the Chubut deposits or Argentina, in the molariform teeth, the fangs have coalesced, but are separated by a deep groove."

In 1902, Dr. T. S. Hall (9) as President of Section C (Geology) of the Hobart meeting of the Australian Association for the Advancement of Science, gave an address "On the Possibility of Detailed Correlation of Australian Formations with those of the Northern Hemisphere." In the course of his remarks on the fauna, after pointing out the possibility of "a southern origin for at any rate some of the Cetacea," he draws attention to a paper by Lydekker in which he proposes a new genus, *Prosqualodon* for a whale having teeth like *Squalodon*, but differing in number, and showing other peculiarities in the skull; Dr. Hall goes on to say: "There is no reason why *Squalodon wilkinsoni*, McCoy, from our Eocene, should not be referred to this southern and older genus, for only a couple of detached teeth seem to be

known." There is, however, no warrant for this, as will be seen by reference to Dr. Hall's later treatment of these remains.

In 1910, True (10) says, "The teeth of *Prosqualodon* which I examined did not exhibit the amount of divergence that Lydekker figured." In 1911, Hall (11) when revising our whale remains of this type, recognized that we did not possess any remains of *Zeuglodon*, *Squalodon* or *Prosqualodon*, and thought it wise to propose two new genera for our southern types, as then known. Under the genus *Parasqualodon*, he places the original *Squalodon wilkinsoni*, McCoy, based on isolated teeth alone; while *Zeuglodon harwoodi* Sanger, also based on isolated teeth is used for founding the genus, *Metasqualodon*.

Thus, according to Hall, two genera and two species are recognized at this date. This treatment was accepted and followed by Mr. F. Chapman (12) in his book on Australian Fossils, in 1914. Then, in 1923, a remarkably good discovery was made at Table Cape by Prof. T. T. Flynn (13), and a descriptive article concerning this specimen appeared in the *Australian Museum Magazine*, entitled "A Whale of Bygone Days." In this article, on page 266, there is an illustration of the scaffolding it was necessary to erect to obtain the specimen from the Turrillia beds, Table Cape; also on this page is the figure of a skull of a Tasmanian whale, fully restored, and named *Prosqualodon davidis*. On page 268, a figure is given of a cast of a Tasmanian fossil whale as exhibited in the Australian Museum, a separate molar tooth also is figured, but no dimensions are given and one has only to surmise that the tooth is natural size. In the restoration fourteen teeth are shown in the upper jaw, and fourteen also in the lower jaw:

$$\begin{array}{ccc} 3 & 3 & 8 \\ \hline \text{I. 3, Pm. 3, M. 8.} \end{array}$$

In the cast fourteen teeth are shown in the upper jaw, while only nine are shown in the lower jaw; i.e., seven molars, two anterior, simple, conical teeth worn or broken; possibly there should be three. There appears to be some discrepancy here.

This is certainly not *Prosqualodon*, in the first place, as in the number and style of the teeth it is distinct from Lydekker's genus. If the tooth obtained by Prof. Tate from these beds is referable to this type of whale, and regarded by Dr. Hall as conspecific with *Parasqualodon wilkinsoni*, it opens up the question of referring *Prosqualodon davidis*, Flynn, to *Parasqualodon*.

In 1925 Zittel, (14) in his *Text Book of Palaeontology*, vol. 3, page 86, quotes *Prosqualodon* with five teeth that are two-rooted, and refers to *P. australis*, Lydekker, Miocene of the Argentine, and *P. davidi*, Flynn, Miocene of Tasmania.

Mammalodon. Genus nov.

Roots of molariform teeth relatively long and broad compared

with the crowns, running about three-fourths to one-fourth for the crown, while the width of the root is about half its length.

The groove showing the tooth to be two-fanged starts from the base of the crown on the outer surface, deepening for half the length of the root, the remaining half showing the two fangs free and parallel with a distinct backward curvature, on the inner surface even the crown itself is somewhat indented near the root.



Fig. 3. Posterior view of base of skull of *Mammalodon coliveri*, Pritchard.

The crown is best preserved on the posterior molar where there is one anterior cusp and three posterior cusps with the apex still worn flat, which would seem to suggest the possibility of two small anterior cusps, one larger central cusp, and three smaller posterior cusps. The surface enamel is hard, dark coloured, and finely fluted or wrinkled.

This type of whale is of small and delicate make, in striking contrast to the gigantic *Kekenodon* of Hector, from the Eocene beds of New Zealand, in fact, the smallness of the teeth with their very fine cusps, only three small cusps on the posterior edge on the molar teeth and the relatively very long two-fanged roots are striking characteristics.

The antiquity and adult character of the specimen, notwithstanding its relatively small size, is well shown by the amount of wear and tear on the upper surface of the teeth, the central cusp and the anterior cusps being entirely removed from the praemolar and some of the molar teeth.

Marked features may be summed up as very small crown to length of root, teeth set very close together in groups with a very definite rake, each molar and praemolar distinctly medially grooved



Left: Fig. 4. Internal aspect of Molar Tooth, $\times 2$.

Right: Fig. 5. External aspect of Molar Tooth, $\times 2$.

indicating double fanged teeth, and very large counter-sunk holes for the anterior teeth. Jaw bones very flat and straight.

Mammalodon colliveri. Gen. and Sp. nov.

DESCRIPTION

Right half of lower jaw 34 centimetres in length, with the extreme anterior end incomplete, teeth occupy 10 centimetres of the middle portion: in this space is implanted six double fanged teeth whilst another socket to the front represents a missing seventh tooth. In this portion the jaw tapers from 6 cm. to 4 cm. in depth from the posterior toward the anterior; posterior portion of the jaw increases rapidly to 15.5 cm. in depth.

These teeth, apparently molars and praemolars, have been worn down to such an extent that nearly the whole of the enamel and cusp portion has been removed. As the teeth are set at a definite rake the anterior is worn down more than the posterior, so that the condition as at present shown is that the front praemolar shows no cusps at all, the next tooth shows a narrow rim of enamel, and one posterior cusp, the next an increased width of enamel and one posterior cusp; the next two succeeding teeth show about the same condition, while the posterior tooth shows one anterior cusp and three posterior cusps, while the crown is still worn flat.

The teeth range in width from 16 mm. to 13 mm., exposed root above the jaw 13 mm. in each of the six teeth. Each is strongly medially grooved without showing the bifid nature of the root.

A single loose molar tooth of similar character and dimensions shows a length of fang of 31 mm., the medial groove deepens on both sides until the root is divided for 13 mm. of its length, the side groove, however, is distinctly deeper on the inner side of the root. The enamel is finely corrugated and the cusps are relatively small.

Judging by the position of the skull bones, it appears that the complete skull was approximately 45 cm. in length; width at the back about 15 cm., and across the front or nasal end, in the region of the fifth tooth, about 10 cm.

The front portion of the palate has split into two pieces and fallen apart, the right half has shed all its teeth, but the sockets indicate the former existence of five teeth; the left half still retains its five teeth. The four front teeth are simple, conical, curved teeth, while the fifth, suggesting a praemolar, shows the presence of the side groove indicating a double fang.

Here again the teeth are well exposed from the jaw, showing an exposure of 20 mm., but the crowns are all worn down to a flat surface.

REMARKS

This type of whale would appear to be of an exceptionally interesting and important as well as ancient form. The whole of the bones present have not yet been fully removed from the matrix, and I have no doubt that much more work could be done on them, and their description would be of considerable significance as well. It is, in my opinion, a very early type of Tertiary whale, showing the closest approach to descent from a mammalian type of ancestor. In Zittel's *Palacontology* (14), volume III, Mammalia, revised by Sir A. S. Woodward, in 1925, page 83, it is stated by Woodward himself that: "The skeleton of this order (Cetacea) is fundamentally mammalian and shows no resemblance whatsoever to that of the fishes or reptiles.

The Cetacea evolved, not from aquatic reptiles, but in all probability from carnivorous, placental land mammals with normal heterodont dentition

$$\frac{3 \ 1 \ 4 \ 3''}{3. \ 1. \ 4. \ 3.}$$

Our present specimen is a definite link in this direction, and as such, is of special value. I fully recognize that I have not done full justice to such an important specimen, but it seems wise to record the above facts as they appear to me, for the benefit of future work and reference.

The age of the rocks from which the specimen was taken has been and still is a matter of some controversy, ranging from Miocene through Oligocene to Eocene, hence the name Jan Jukian for the horizon. Personally, I am still in favour of Eocene, and in this important addition I see nothing to alter that opinion, but rather it seems a further pointer in that direction.

I wish to record my thanks to Mr. Alan Frostick for the photographs from which the figures have been produced, and for very able assistance in the field; also in this respect I desire to include Mr. Stanley Colliver, after whom it has been a great pleasure to name this specimen. I thank Mr. F. Cudmore, librarian of the Royal Society of Victoria, for allowing access to Lydekker's South American work, as well as Mr. Malone, librarian to the National Museum, Melbourne, for assistance in hunting out works of reference in connection with this paper.

References:

1. F. McCoy: On the occurrence of the Genus *Squalodon* in the Tertiary Strata of Victoria. *Geo. Mag.*, Vol. IV, No. 34, p. 145. 1864.
2. F. McCoy: Recent Zoology and Palaeontology of Victoria. *Official Record Inter-colonial Exhibition*. 1866, p. 16.
3. F. McCoy: Prodrromus of the Palaeontology of Victoria. Decade 2. *Geol. Surv. of Victoria*. Special Publication. 1875.
4. F. McCoy: Item. Decade VI, *Ibid.* 1789.
5. E. B. Sanger: On a Molar Tooth of *Zeuglodon* from the Tertiary Beds on the Murray River near Wellington, S.A. *Proc. Linn. Soc. New South Wales*, Vol V, pt. iii., pp. 298-300. 1881.
6. R. Tate: Census of the Fauna of the Older Tertiary of Australia. *Proc. Roy. Soc. New South Wales*, Vol. XXII, p. 240. 1888.
7. R. Lydekker: Cetacean Skulls from Patagonia. *Anales Mus la Plata; Pal. Argentina*, Pt. 2, Art. 2, p. 8. 1893.
8. R. Lydekker: On a Skull of a Shark-toothed Dolphin from Patagonia. *Proc. Zool. Soc. London*, p. 921. 1899.
9. T. S. Hall: The Possibility of Detailed Correlation of Australian Formations with those of the Northern Hemisphere. *Rept. Austr. Assoc. Adv. Sci.*, Vol. IX, p. 165. 1902.
10. F. W. Trice. *Smithsonian Misc. Coll.*, Vol. 52., p. 441. 1910.
11. T. S. Hall: On the Systematic position of the species of *Squalodon* and *Zeuglodon* described from Australia and New Zealand. *Proc. Roy. Soc. Victoria*. Vol. XXIII (ns.), pt. 2, p. 257. 1911.
12. F. Chapman: Australian Fossils. Pp. 341, 8vo. 1914.
13. T. T. Flynn: A Whale of Bygone Days. *Aust. Mus. Mag.*, Vol. I, No. 9, p. 266. 1923.